

# Septimus Nice

## Echographie cardiaque et hémodynamique avancée



GE HealthCare

Hôpitaux  
Universitaires  
de Marseille | ap.  
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Médecin Urgentiste  
AP-HM Hôpital La Timone Adultes  
Marseille

Faculté des sciences  
médicales et paramédicales  
Aix Marseille Université

## ***08h45 – 09h00 : Accueil des participants***

09h00 – 09h30 : Concept des pressions de remplissage du ventricule gauche

09h30 – 10h30 : Le Ventricule Droit

## ***10h30 – 11h00 : Pause***

11h00 – 12h00 : Ateliers pratiques

## ***12h00 – 13h00 : Pause repas***

13h00 – 14h00 : Détresse respiratoire

14h00 – 15h00 : Etat de choc

15h00 – 16h00 : Ateliers pratiques

16h00 – 17h00 : Quizz interactif



# Echographie cardiaque et hémodynamique avancée

## Concept des PRVG



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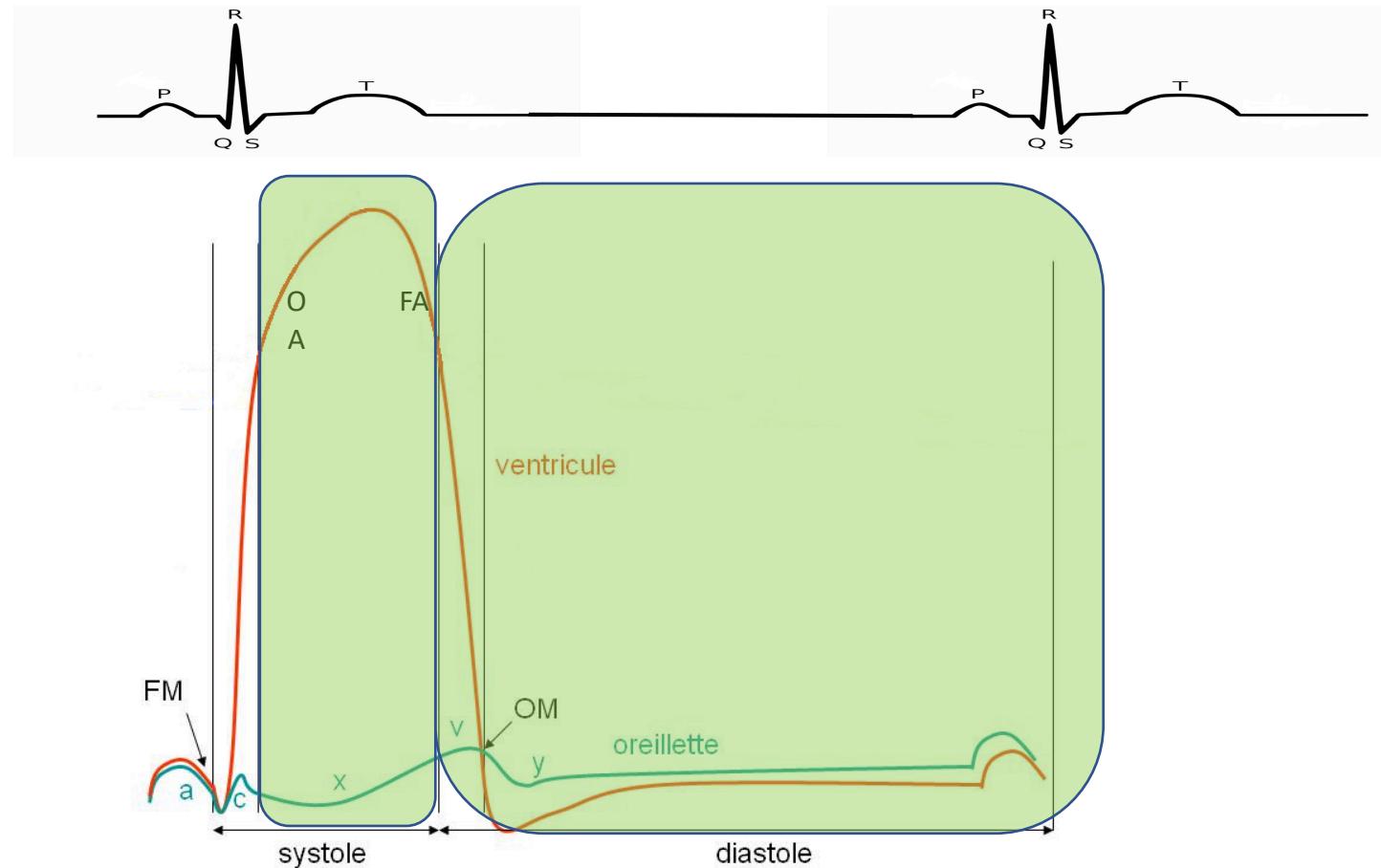
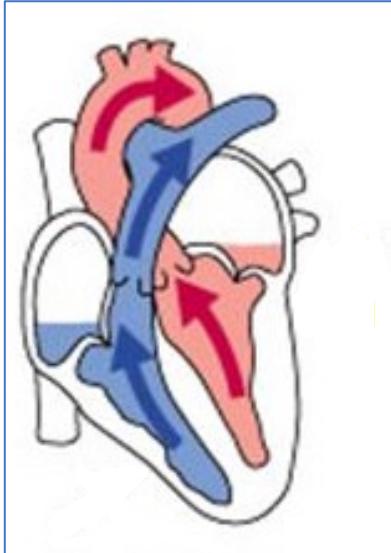
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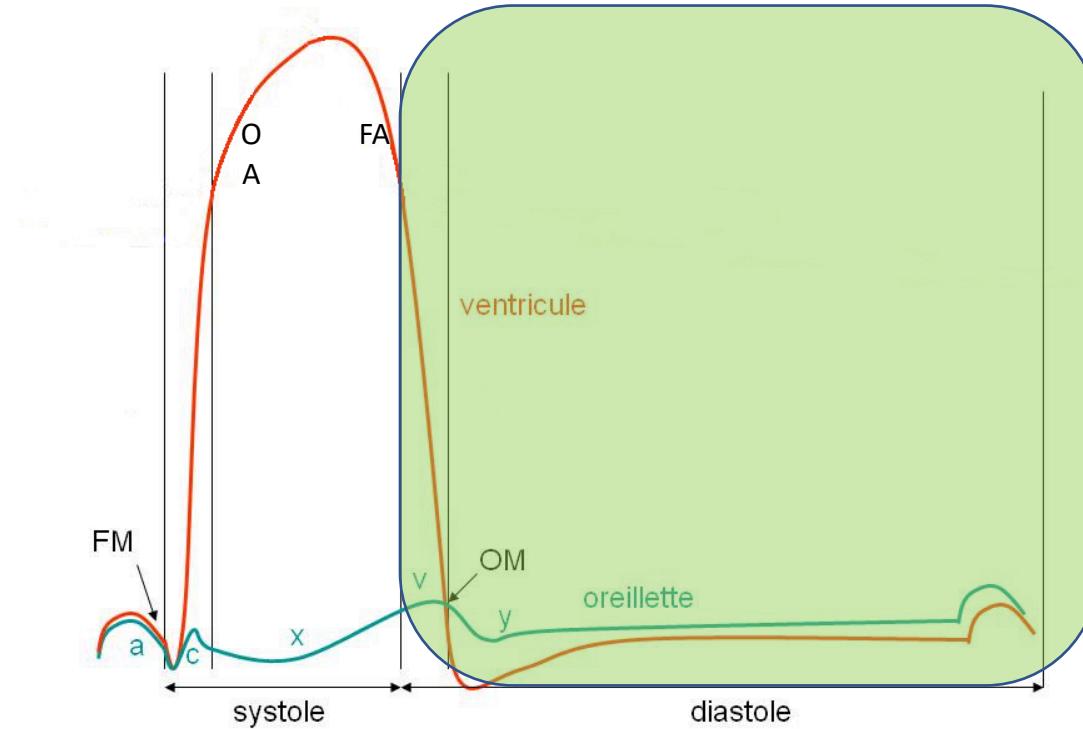
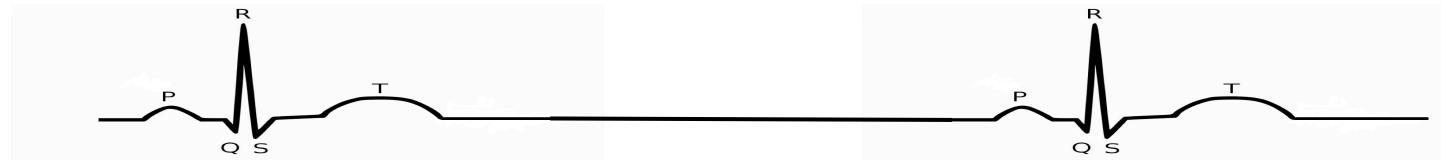
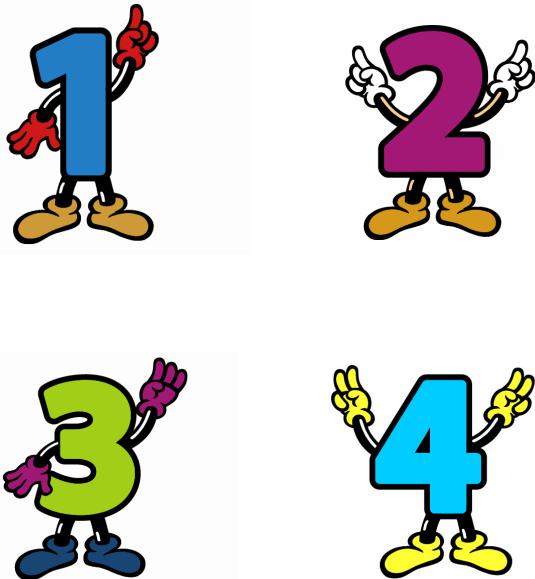
## Remplissage ventriculaire gauche

**SYSTOLE**



## Remplissage ventriculaire gauche

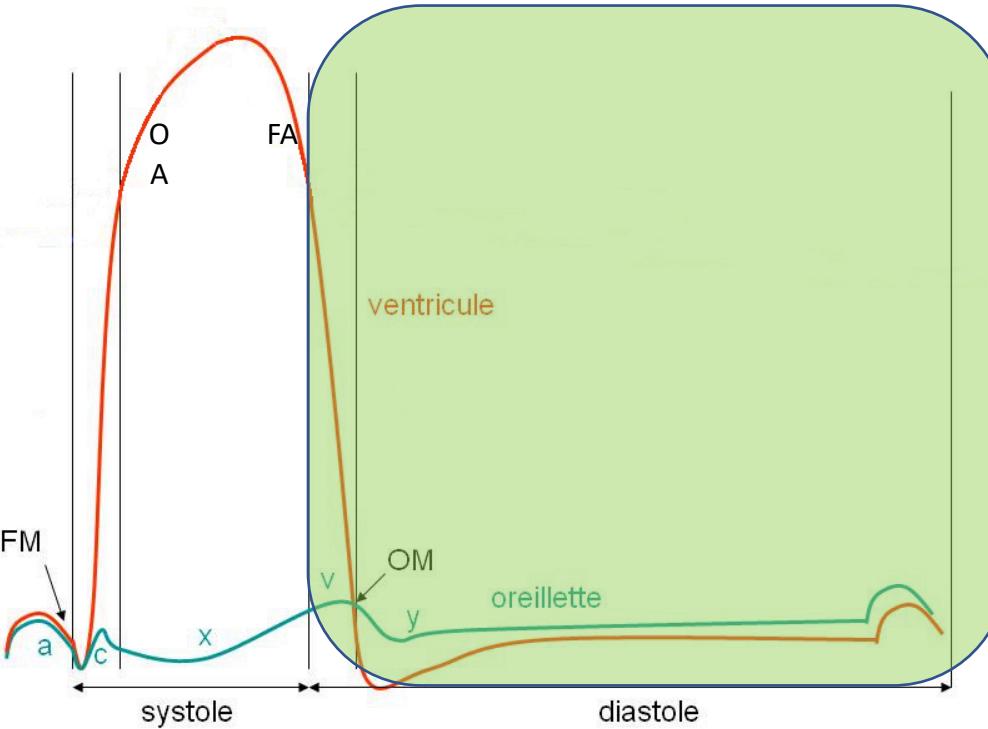
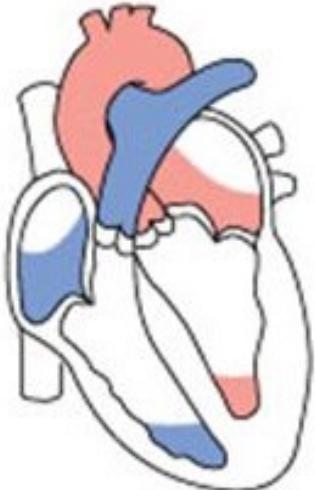
DIASTOLE



# Remplissage ventriculaire gauche

DIASTOLE

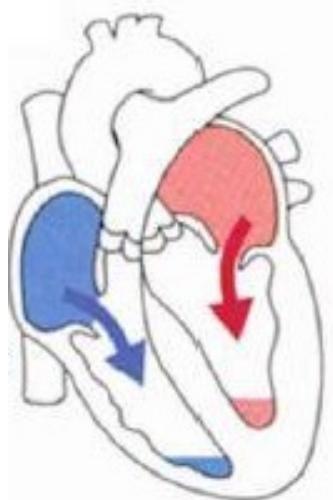
RELAXATION ISOVOLUMETRIQUE



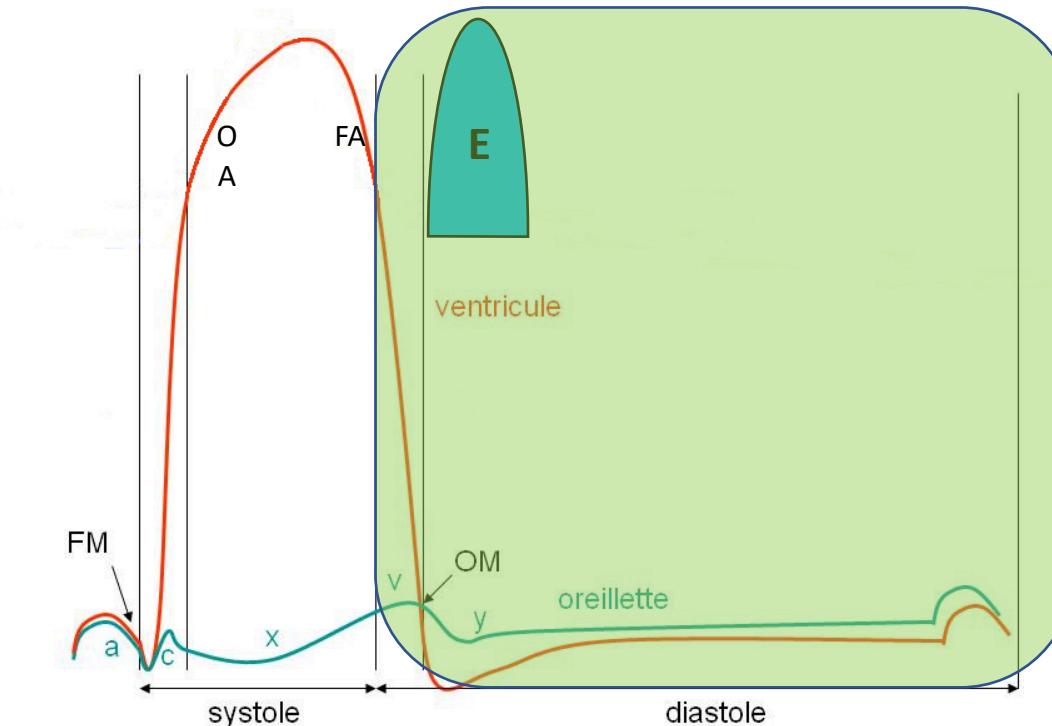
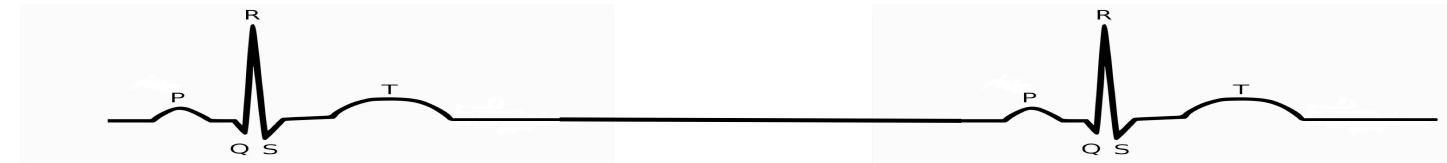
RI

## Remplissage ventriculaire gauche

DIASTOLE  
REmplissage precoce



ECG



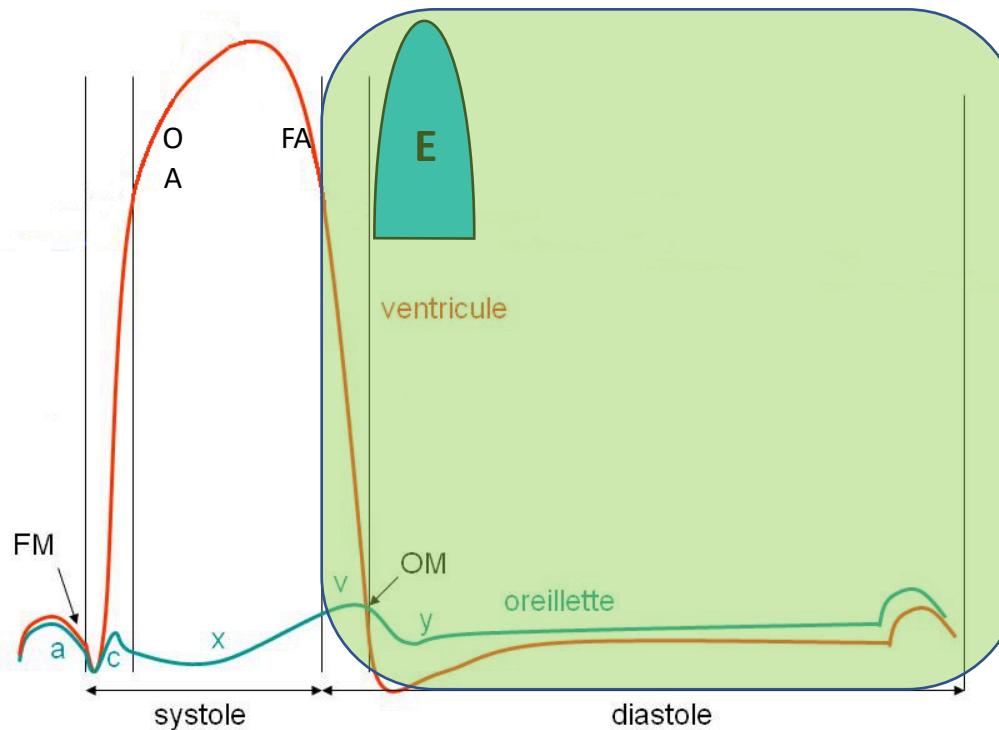
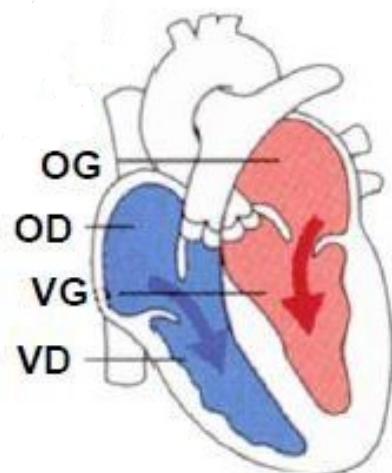
1. Gradient de pression OG – VG
  2. Recul élastique du muscle VG
- Effet de succion

RI RP

# Remplissage ventriculaire gauche

DIASTOLE

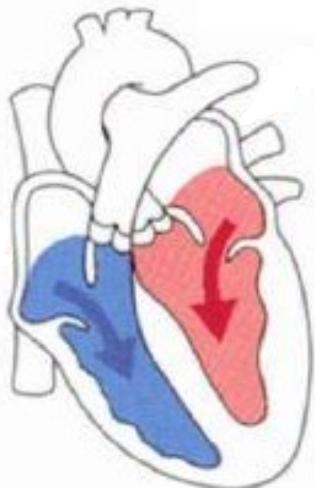
DIASTASE



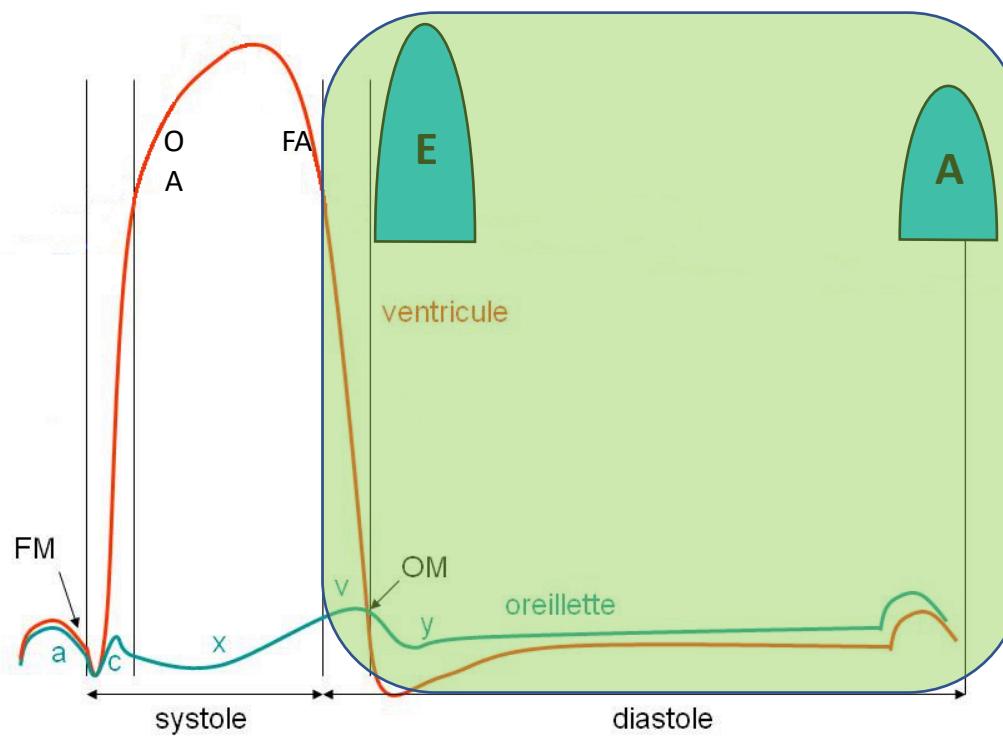
RI	RP	Diastase
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# Remplissage ventriculaire gauche

DIAS TOLE  
REMPISSAGE TARDIF



CONTRACTION OG



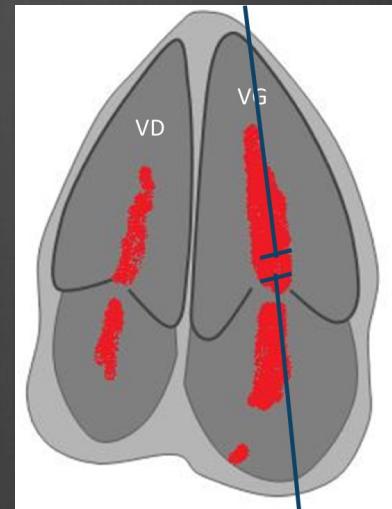
RI	RP	Dias tase	RA
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Remplissage ventriculaire gauche

PRECOCE = E = gradient de pression + relaxation VG

TARDIF = A = contraction OG

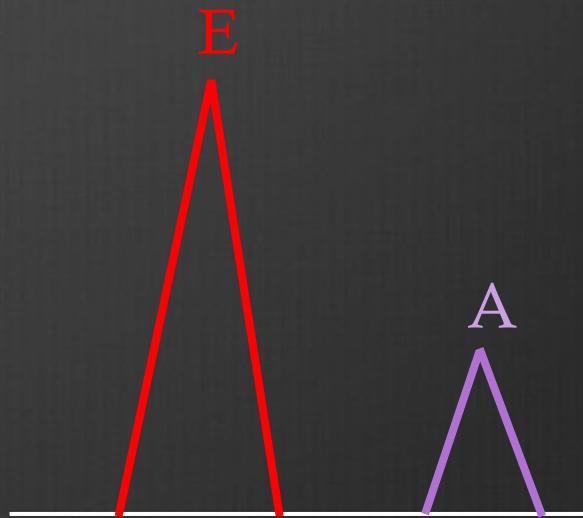
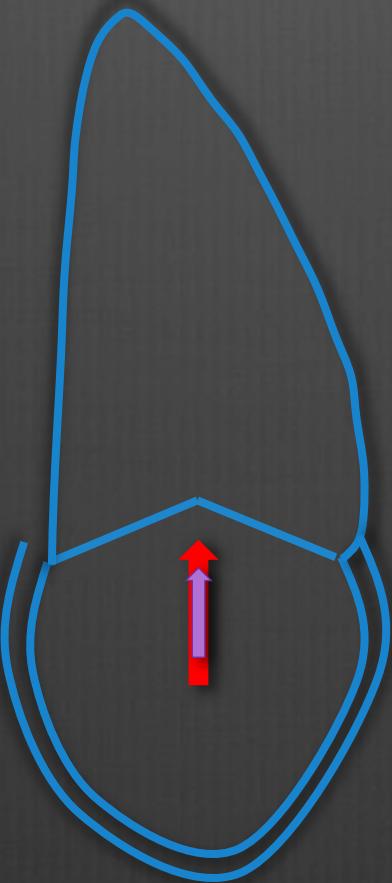
Doppler Mitral



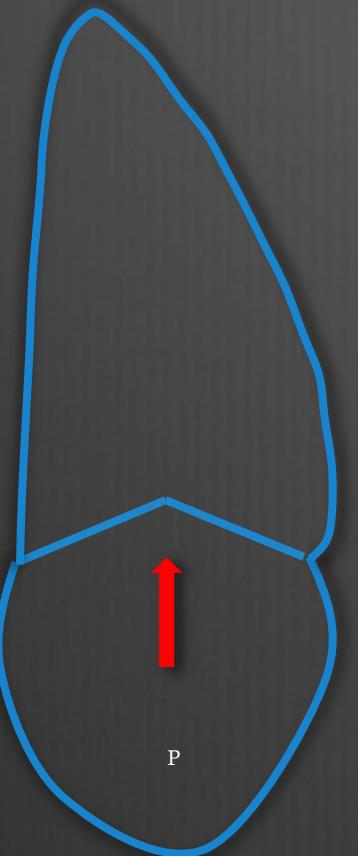
PRVG

E = Early

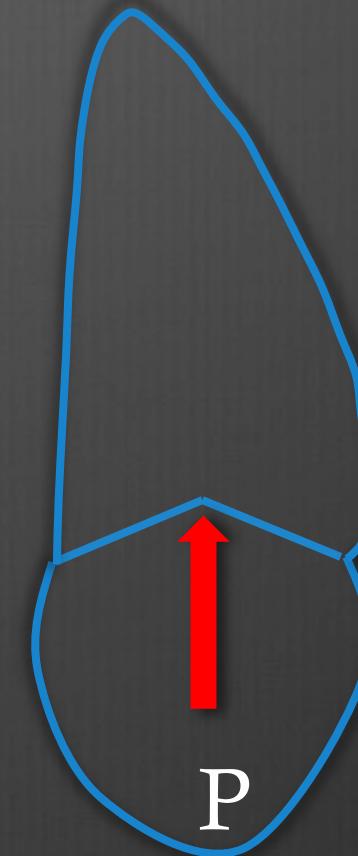
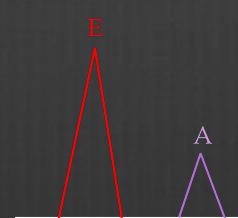
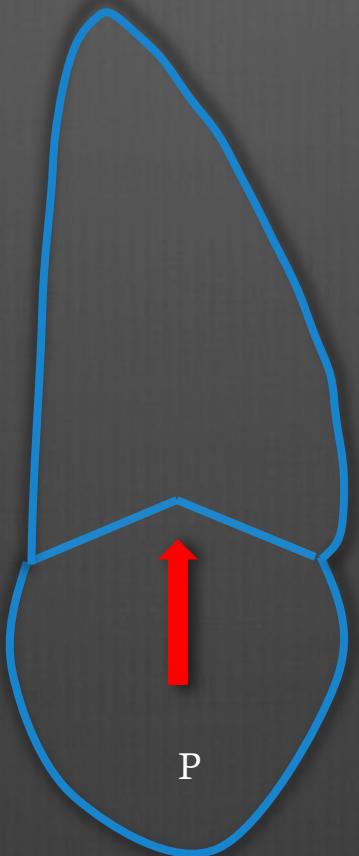
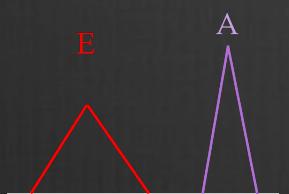
A = Atrium



d'après X. Bobbia



PRVG non élevées



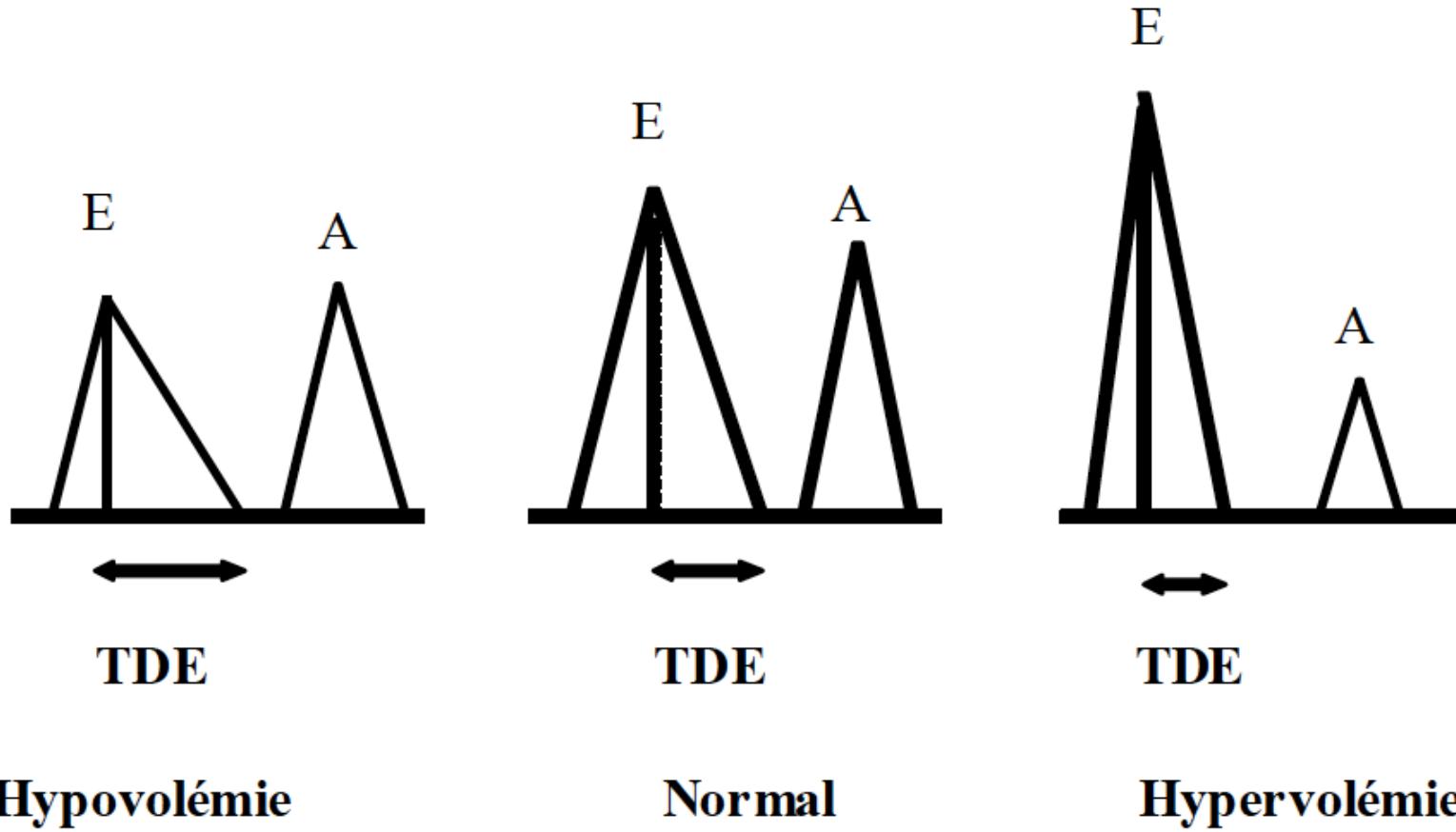
PRVG élevées

## Doppler mitral

$E/A < 1$

$E/A = 1 - 2$

$E/A > 2$

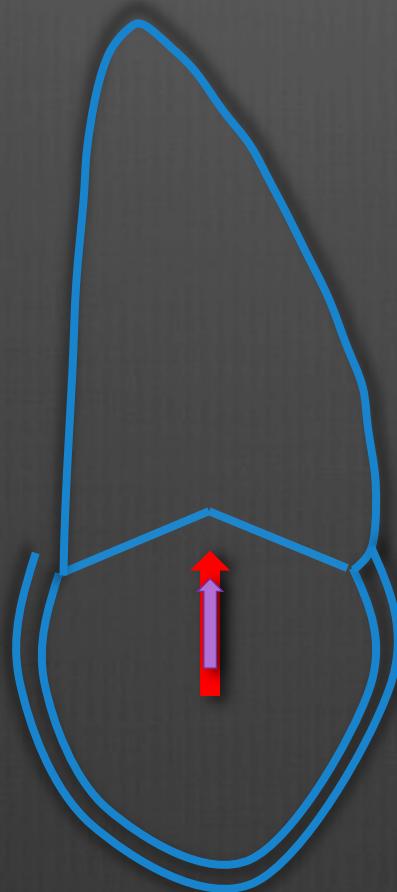
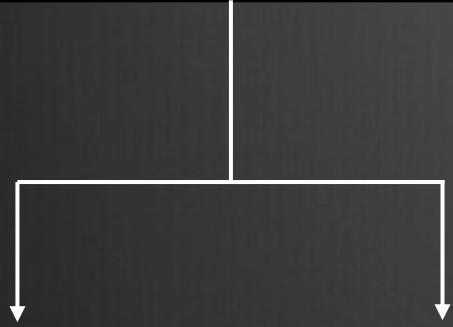


Variations des ondes E, A et TDE en fonction du statut volémique

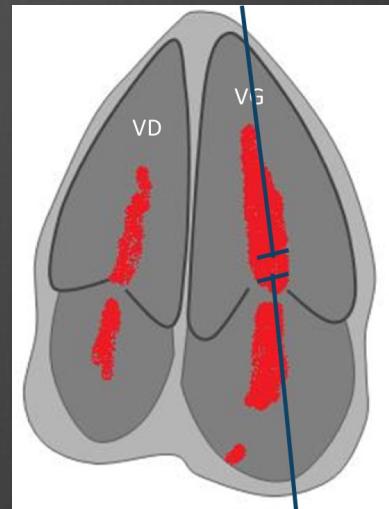
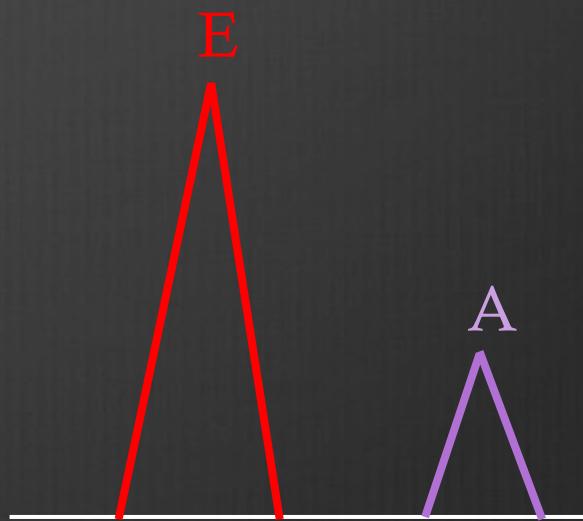
Remplissage ventriculaire gauche

E = gradient de pression + relaxation VG

A = contraction OG

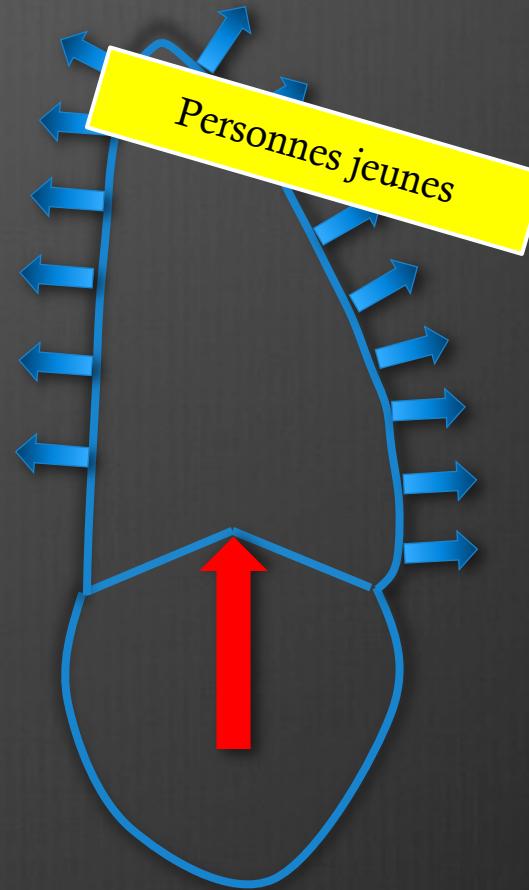
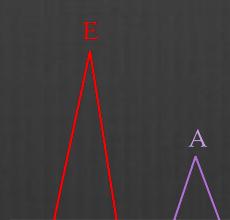
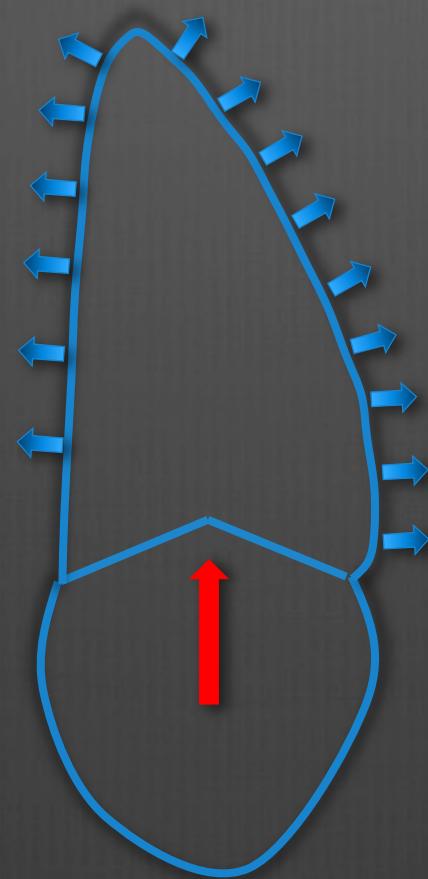
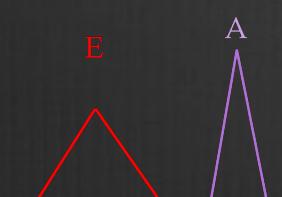
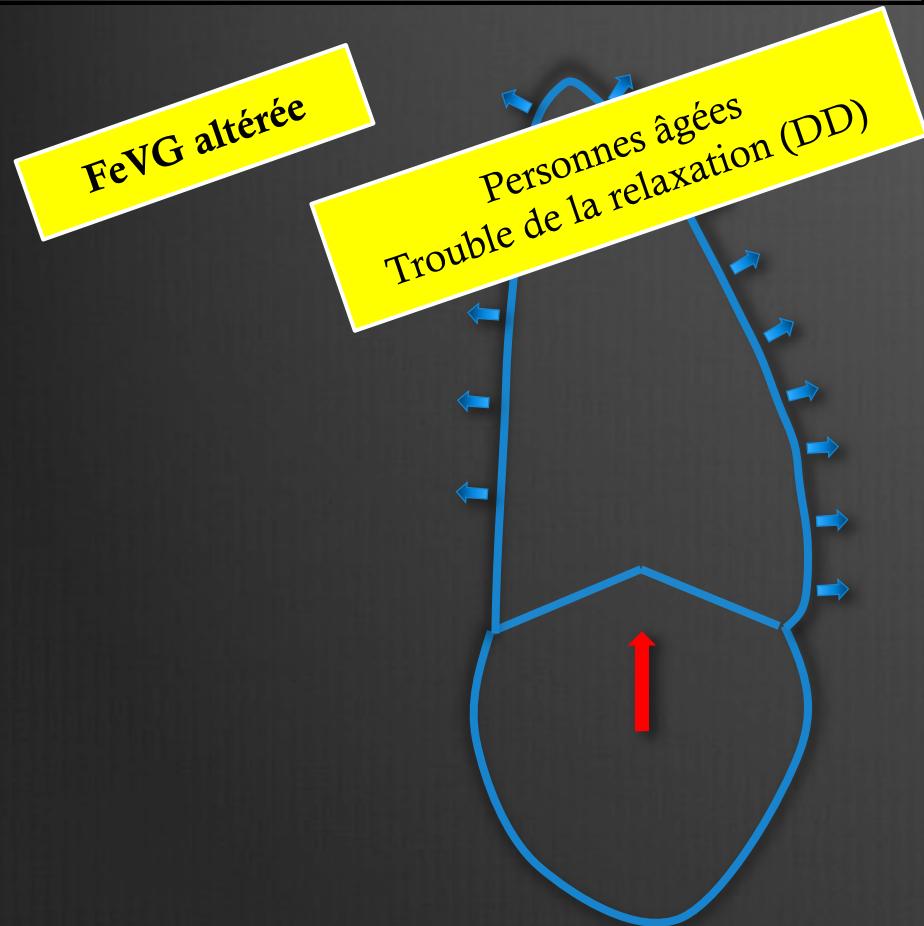


Doppler Mitral



d'après X. Bobbia

**E = gradient de pression + relaxation VG**



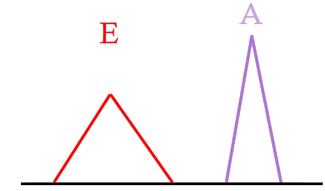
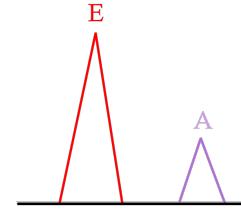
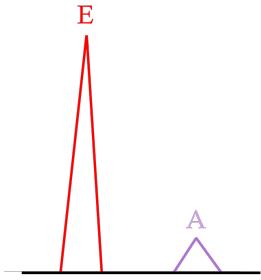
d'après X. Bobbia





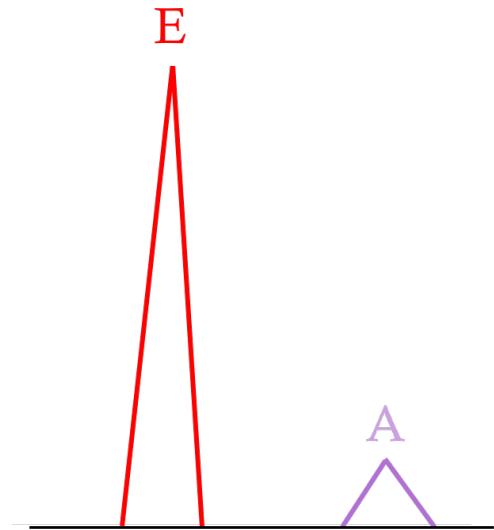
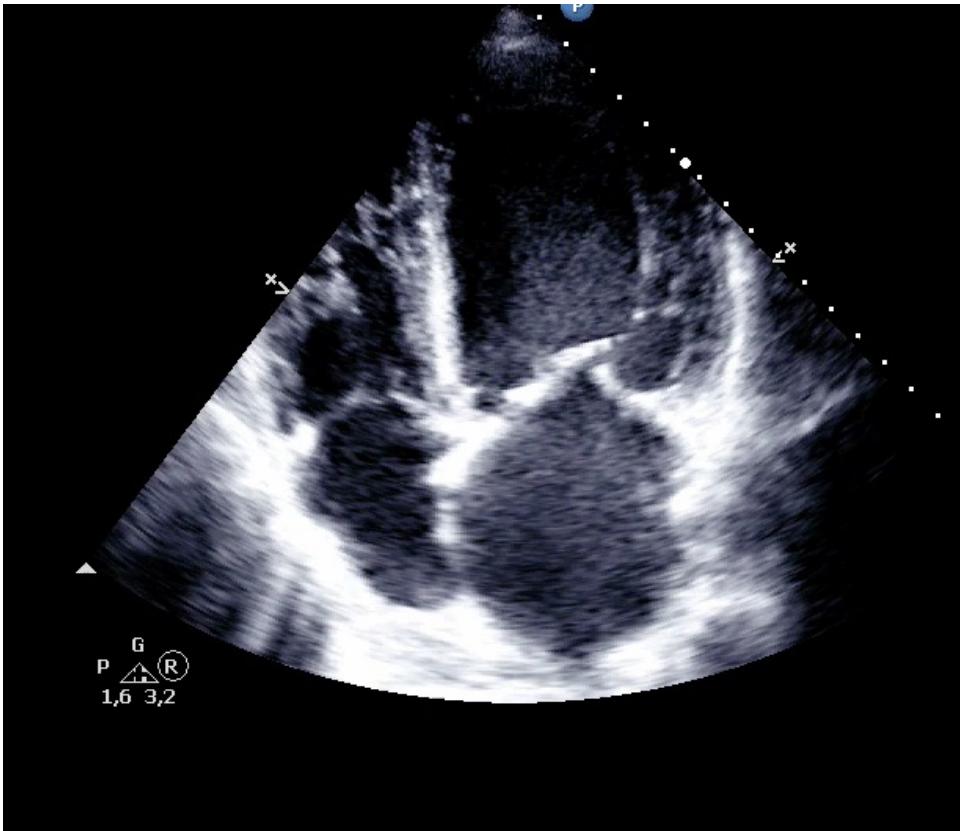


**E = Et merde je saute beaucoup moins haut l'âge faisant**

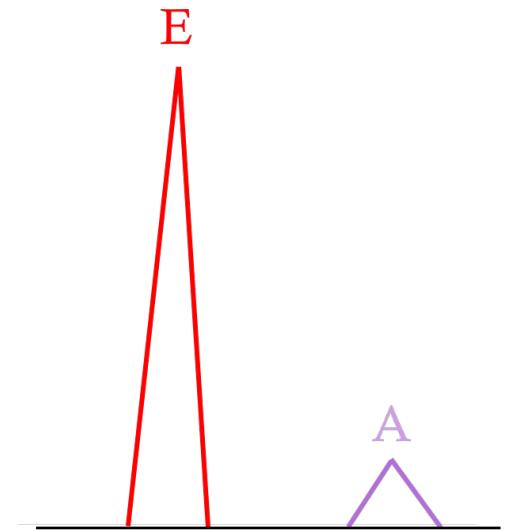
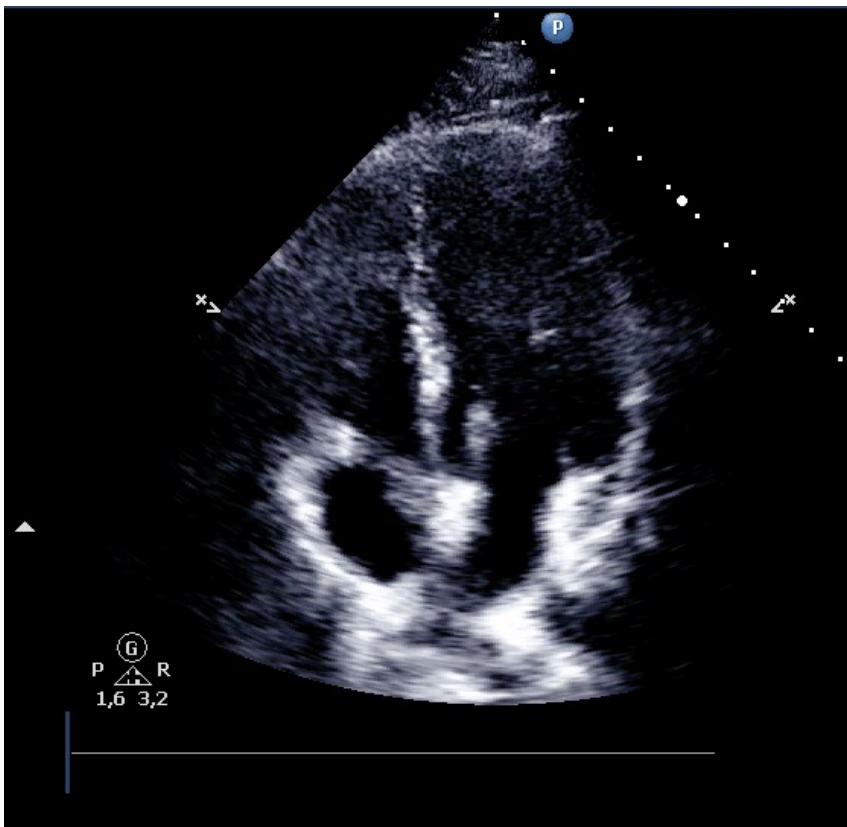


FEVG normale ??

FEVG altérée



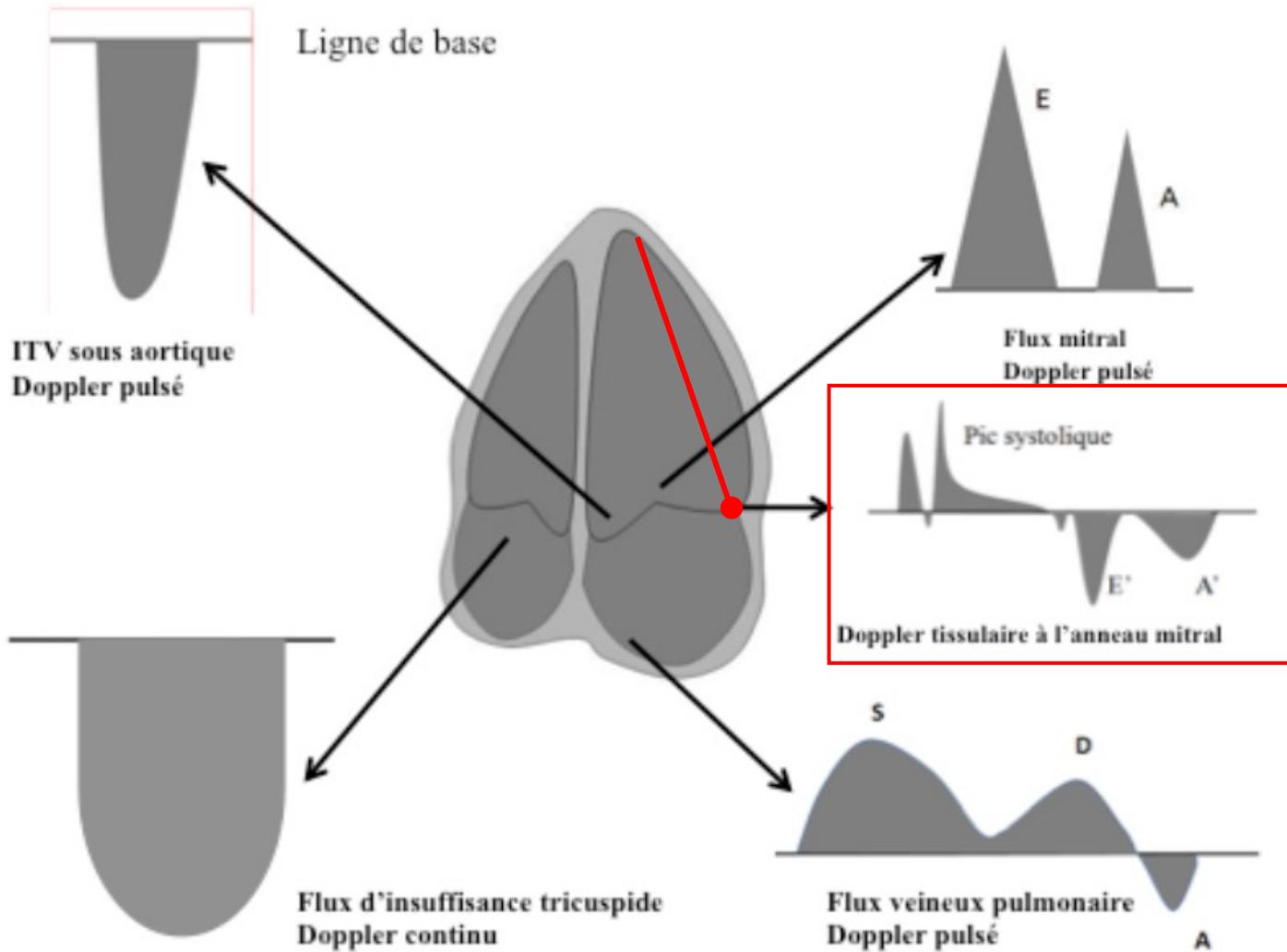
OAP



## Doppler tissulaire à l'anneau mitral



➤ Doppler Tissulaire à l'anneau mitral

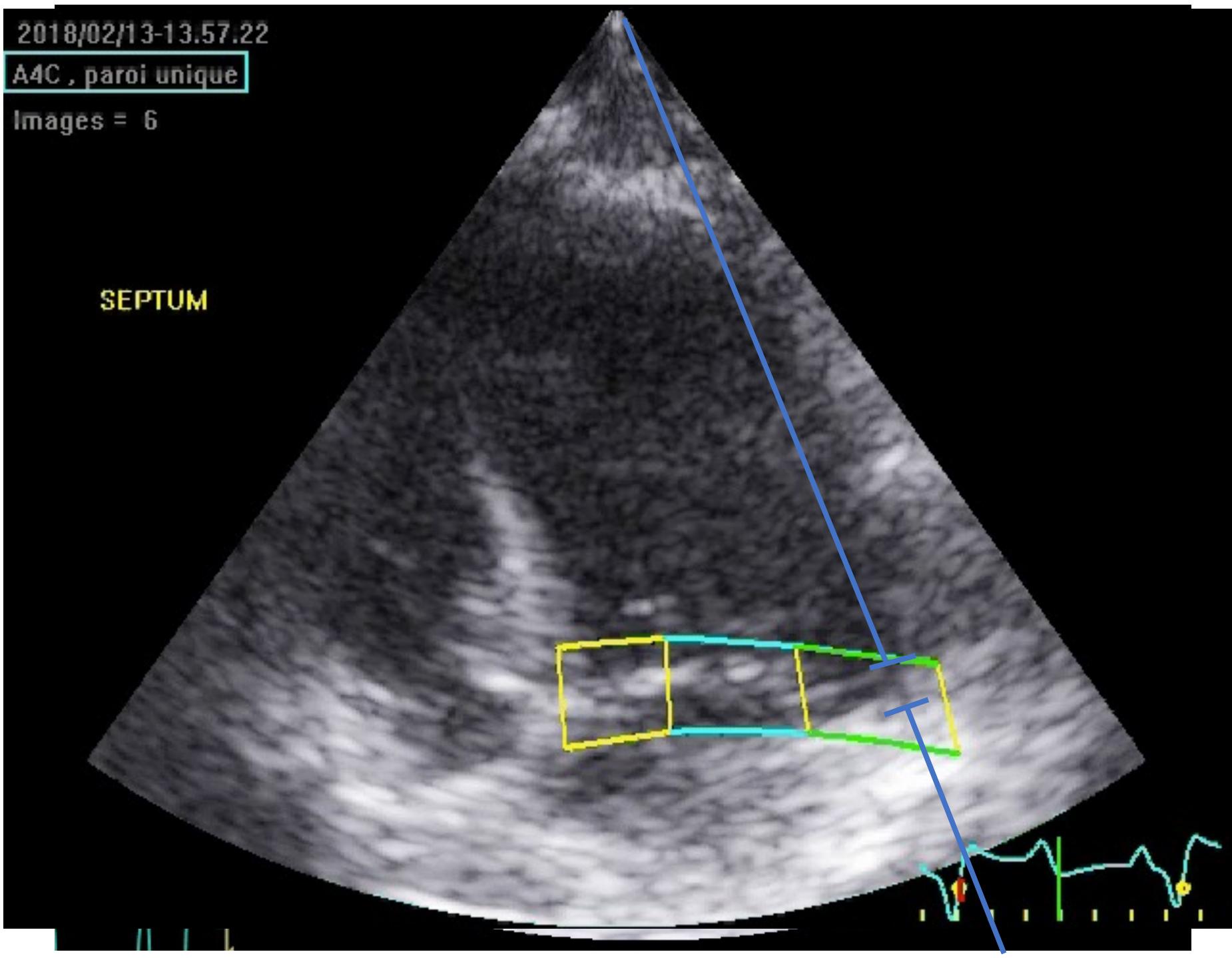


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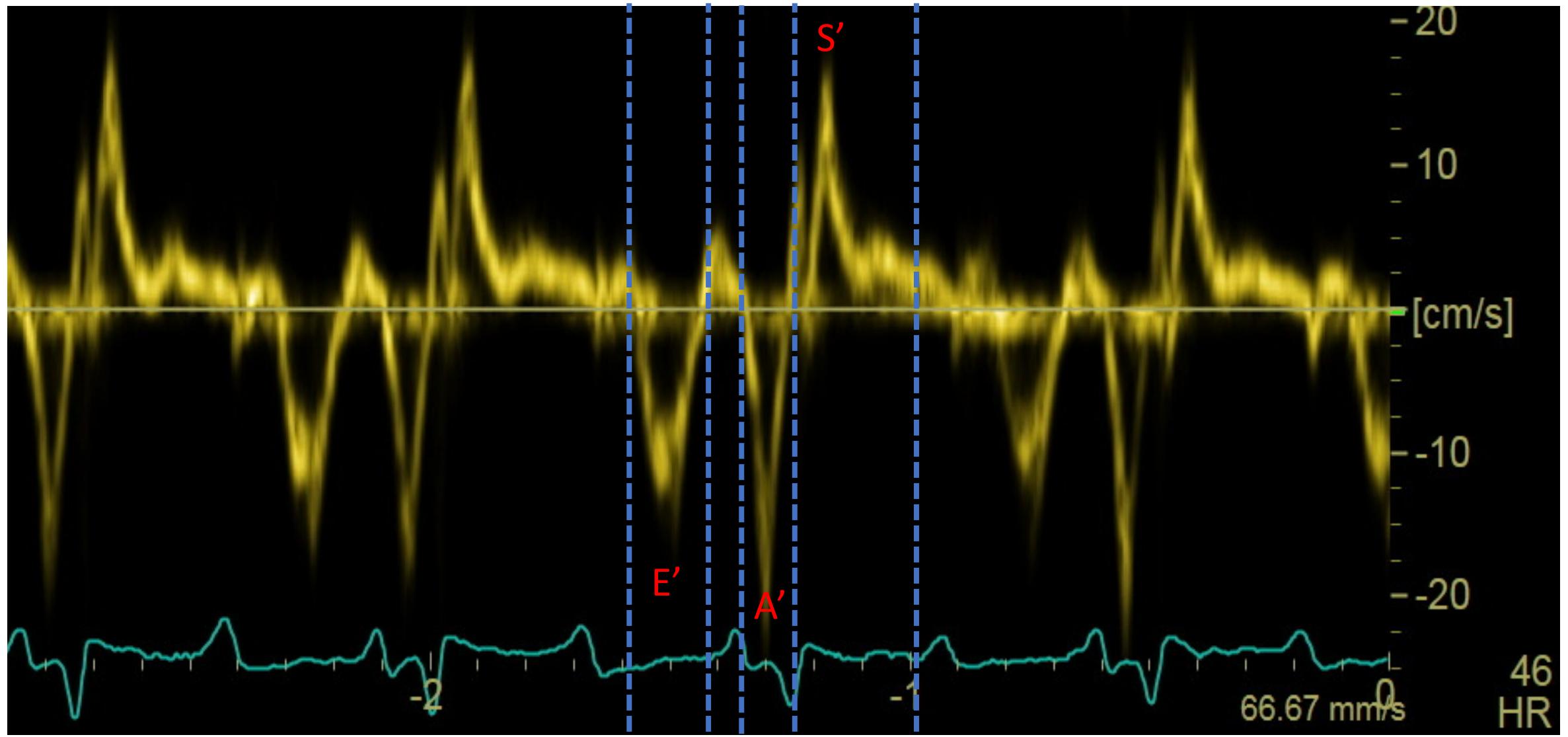
A4C , paroi unique

Images = 6

SEPTUM



d'après X. Bobbia



d'après X. Bobbia

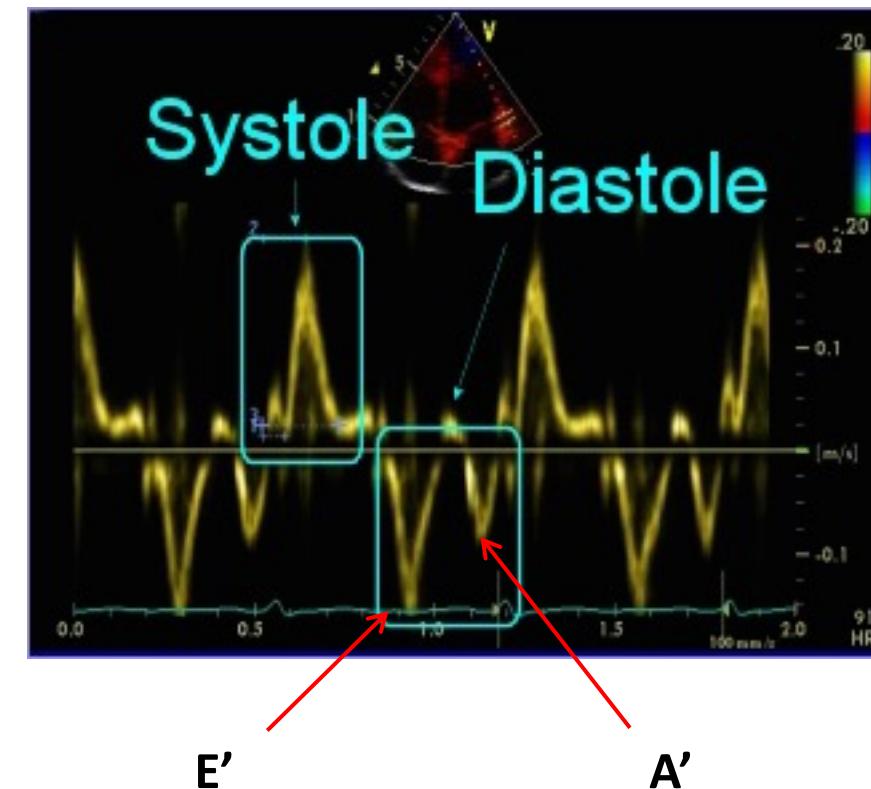
## Doppler tissulaire à l'anneau mitral

- Suppression du filtre passe-haut / enregistrement des basses vélocités (mouvement du myocarde)
- Étude de la vitesse protodiastolique E' au niveau de la partie latérale (ou septale) de l'anneau mitral
- Vitesse E' diminue en cas d'anomalie de la relaxation ventriculaire gauche ET de façon indépendante des conditions de charge
- Intérêt ++ en cas de profil mitral « normalisé »
- Autre intérêt dans le cadre des CMH ou FeVG normale

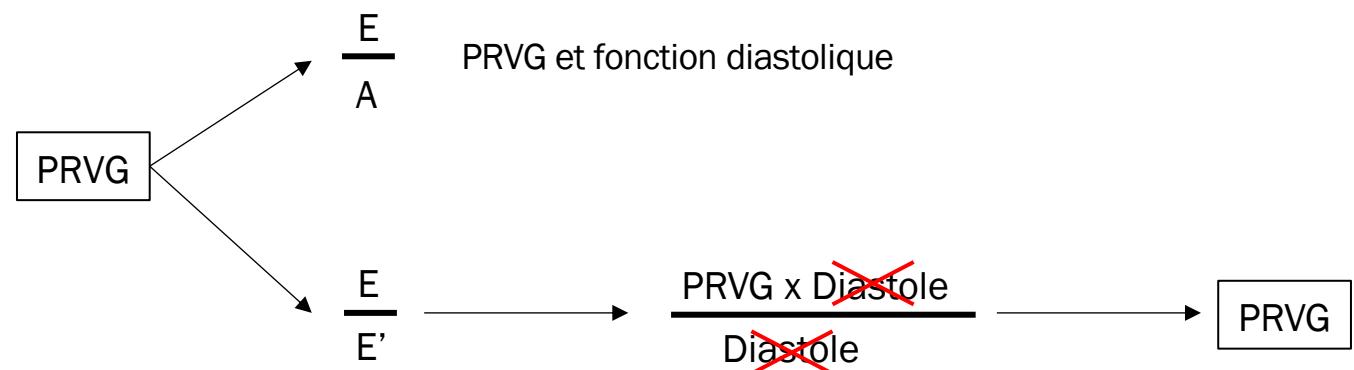
Vitesse onde E' = fonction diastolique

E' lat  $\geq$  10 = fonction diastolique normale

E' lat < 10 = dysfonction diastolique



Et concernant l'évaluation des PRVG ?



### 3 situations cliniques

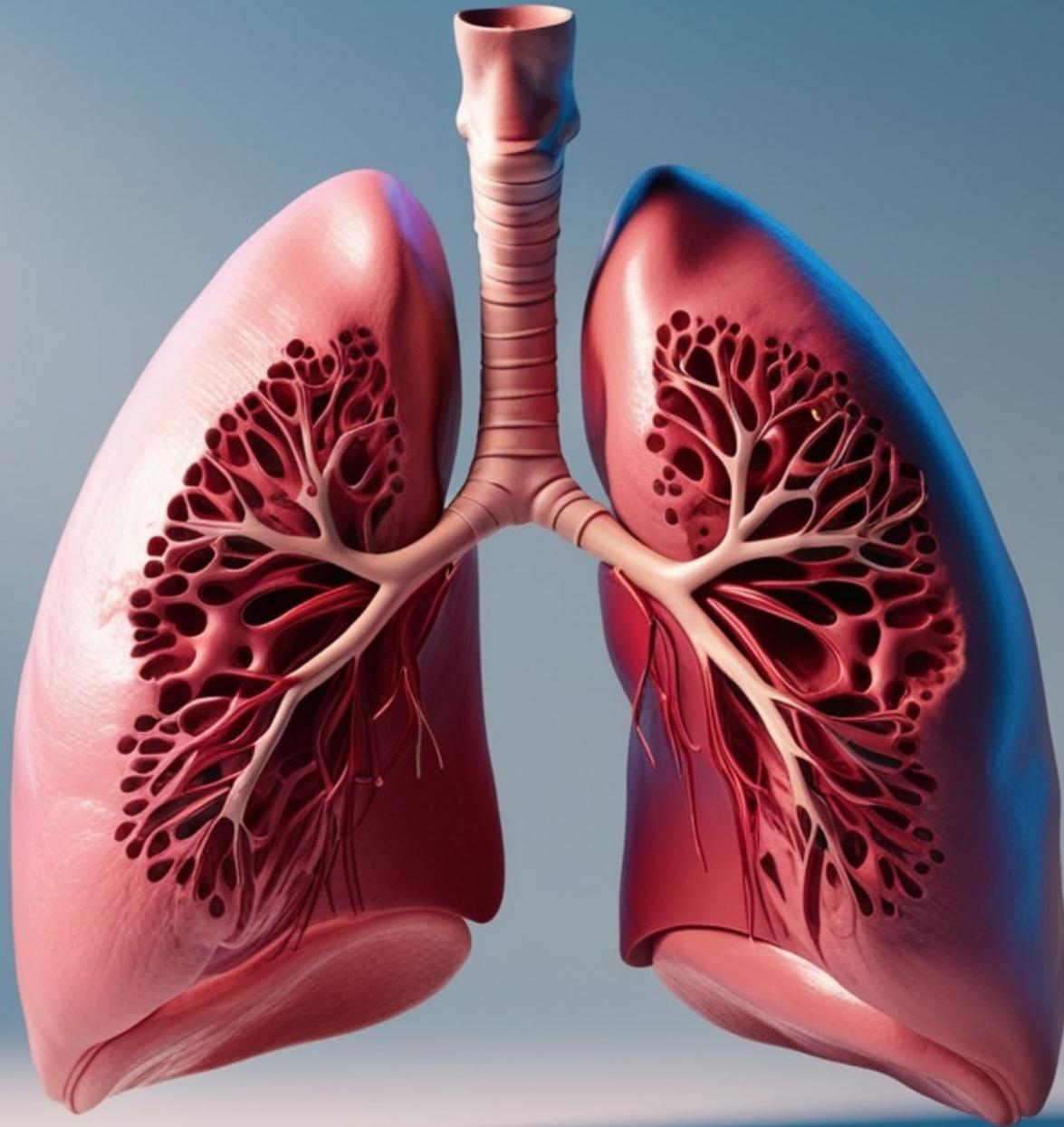
1. Patients âgés / FeVG altérée  $\longrightarrow \frac{E}{A} \longrightarrow$  zone grise  $\longrightarrow \frac{E}{E'}$
2. Patients jeunes / FeVG normale  $\longrightarrow \frac{E}{E'}$ 

$E/E' \text{ lat} \leq 7 = \text{PRVG non élevées}$

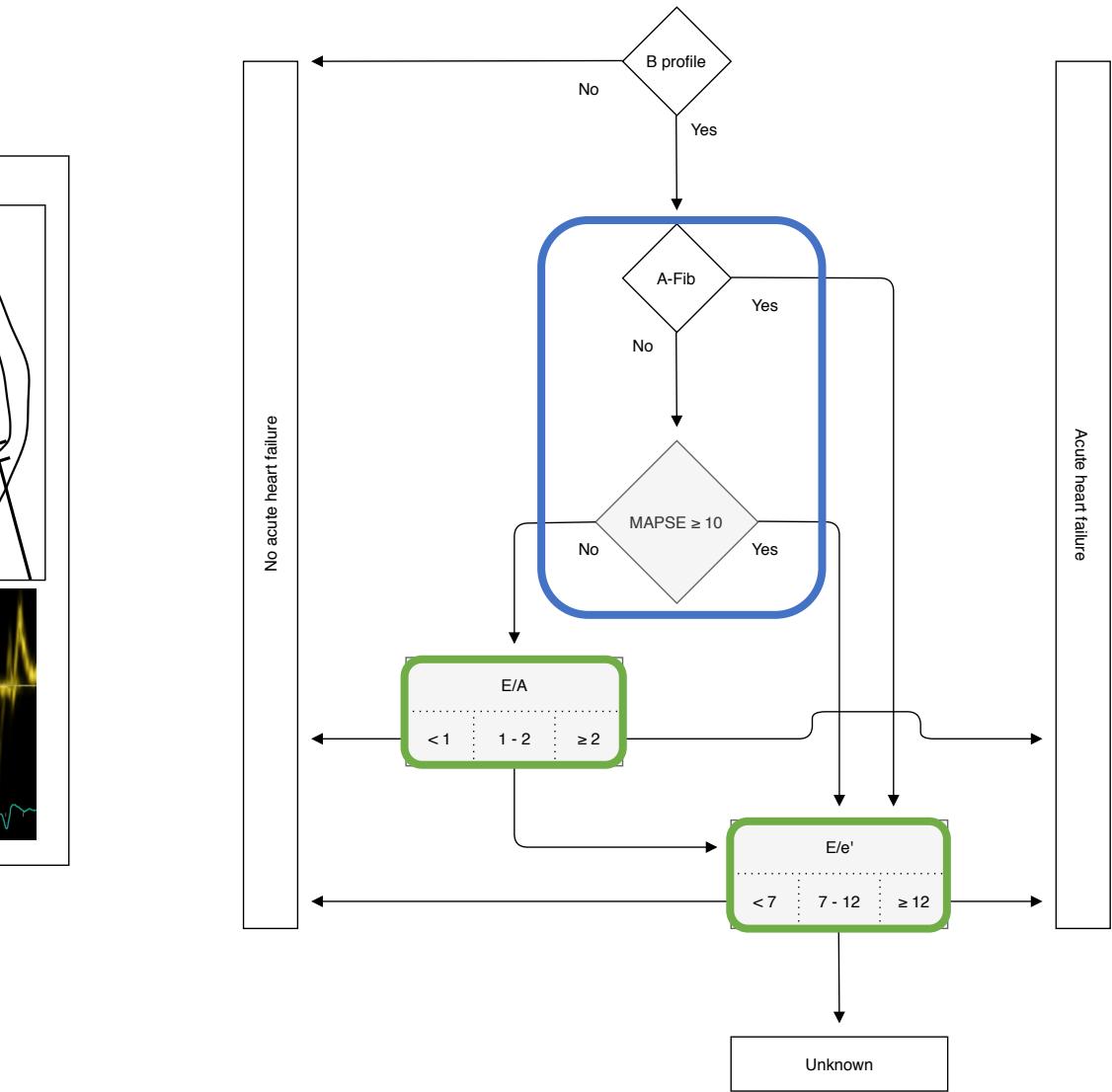
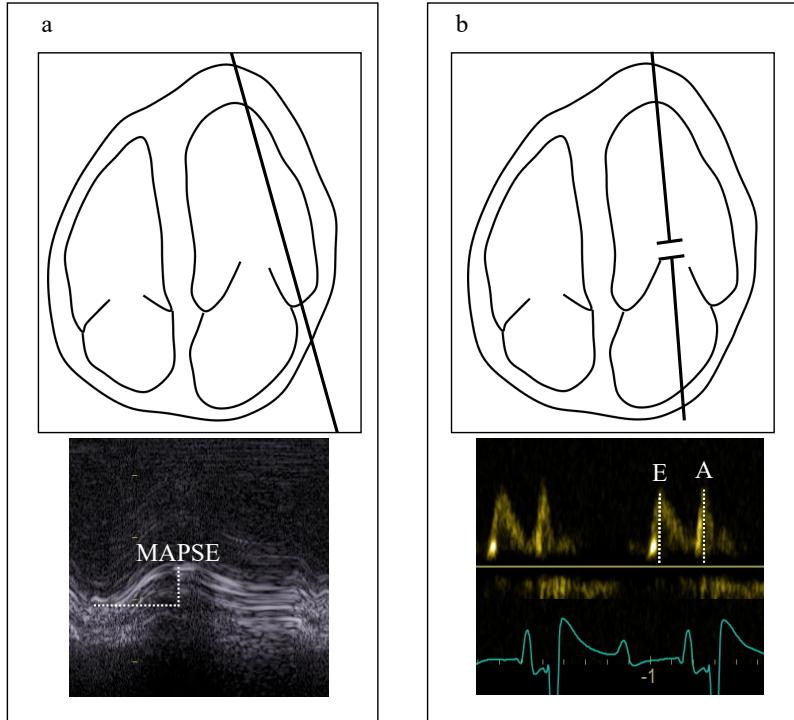
$E/E' \text{ lat} = 8 - 12 = \text{zone grise}$

$E/E' \text{ lat} > 12 = \text{PRVG élevées}$
3. Fibrillation auriculaire  $\longrightarrow \frac{E}{E'}$

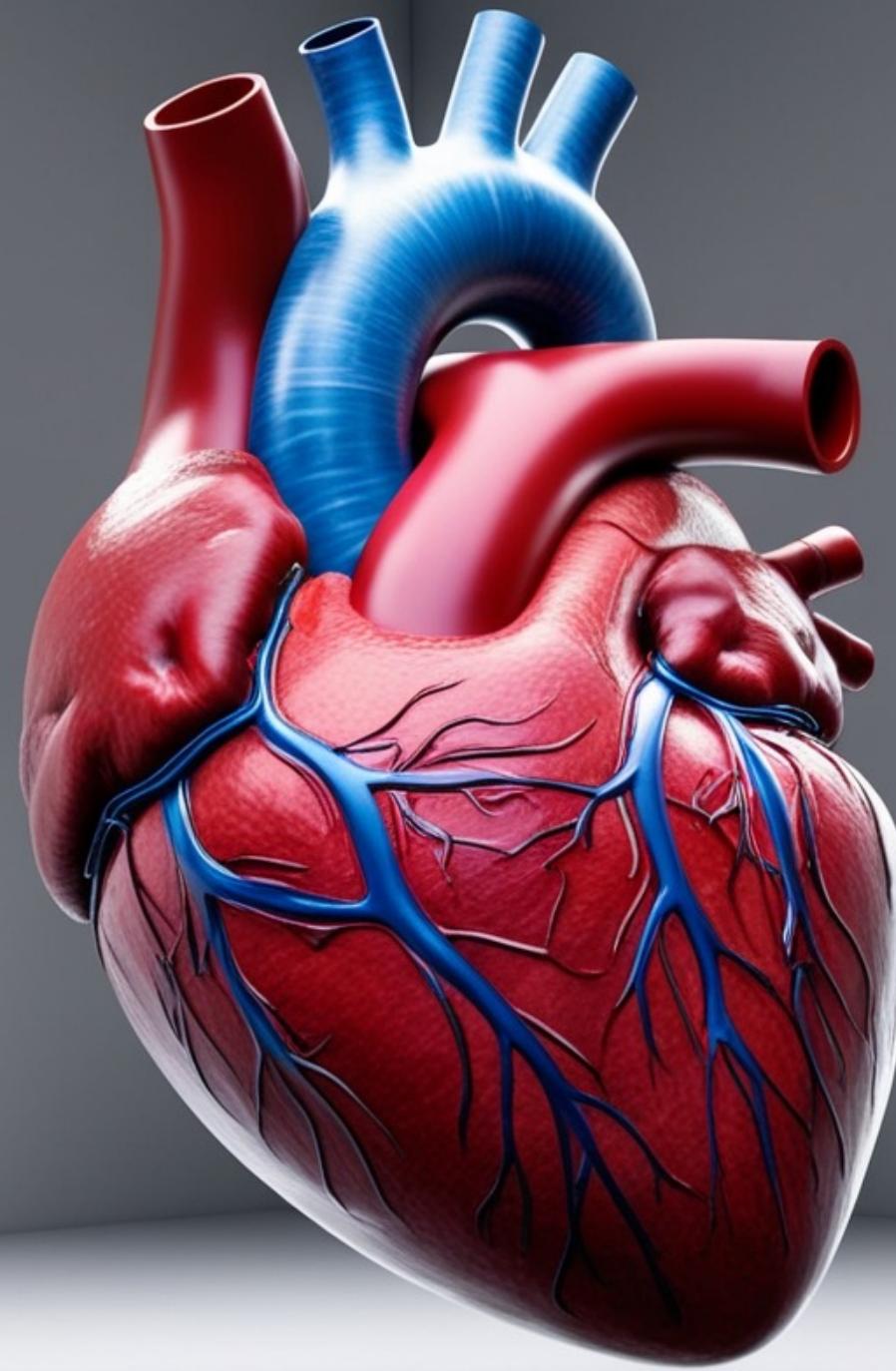
1



# PRVG et détresse respiratoire aiguë



2



## PRVG et état de choc

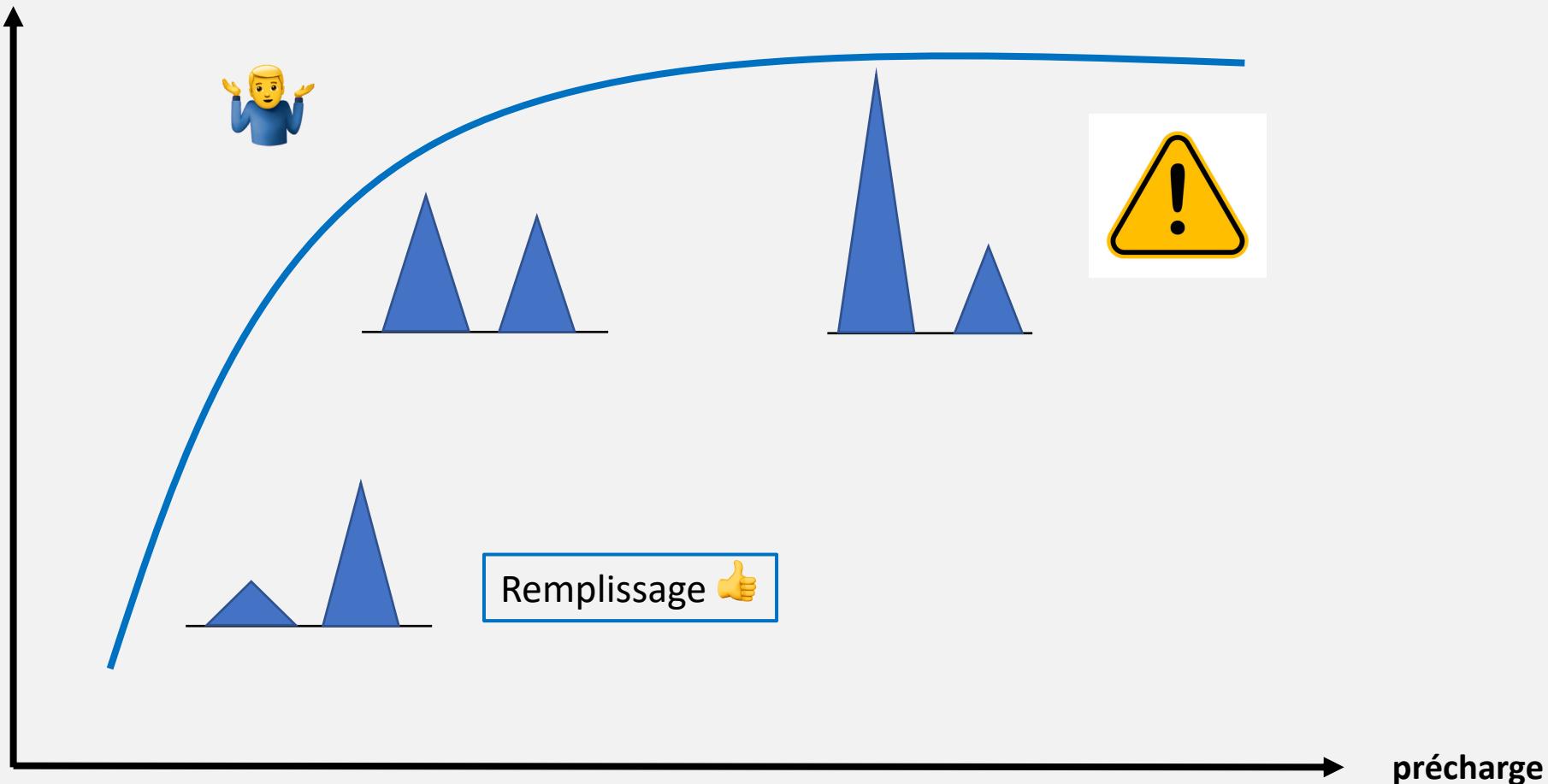
	All patients (n = 40)	Responders (n = 20)	Non-responders (n = 20)	P-value
Age, years	63 (56, 70)	61 (49, 70)	66 (53, 75)	0.58
Weight, Kg	72 (65, 77)	67 (63, 76)	76 (63, 88)	0.14
Height, cm	169 (164, 173)	170 (162, 176)	168 (160, 173)	0.38
APACHE II score	17 (14, 23)	18 (14, 29)	14 (11, 21)	0.30
Heart rate, bpm	101 (91, 116)	101 (91, 125)	103 (79, 121)	0.78
Mean arterial pressure, mmHg	71 (66, 77)	70 (61, 88)	72 (65, 87)	0.56
LVEF, %	55 (50, 60)	55 (50, 60)	55 (47, 60)	0.41
Velocity time index, cm	16 (14, 18)	14 (12, 16)	17 (15, 21)	< 0.01
E velocity, cm/s	75 (70, 80)	65 (53, 76)	82 (75, 93)	< 0.01
E/A velocity ratio	0,9 (0,8, 1,1)	0,8 (0,6, 1,1)	1,0 (0,8, 1,4)	< 0.01
Ea velocity, cm/s	12 (10, 13)	12 (9, 14)	11 (9, 15)	0.79
E/Ea velocity ratio	6 (5, 8)	5 (5, 10)	7 (5, 8)	0.40
cIVC, %	34 (16, 64)	64 (28, 100)	19 (5, 35)	< 0.01

### onde E < 0,7 m/s

- sensibilité 67%
- spécificité 90%
- AUC = 0,83

# SECURITE

volume éjection  
systolique



- **Détresse Respiratoire Aiguë** : affirmer ou infirmer le diagnostic d'oedème cardiogénique en présence d'un syndrome interstitiel
- **Etat de choc** : évaluer les conditions volémiques « extrêmes » = attitude sécuritaire type red flags

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